

REMARKS

In this Amendment after Final, Applicants propose cancelling claims 8, 13, 18, 24, 25, and 32, without prejudice or disclaimer of their subject matter. Applicants further propose amending claims 1, 5, 6, 11, 14, 22, 26, and 33 to more appropriately define the present invention, and amending claim 34 to change its dependency. Upon entry of this Amendment after Final, claims 1-7, 9-12, 14-17, 19-23, 26-31, 33, and 34 remain pending and under current examination.

Regarding the Office Action:

In the Final Office Action, the Examiner rejected claims 1-34 under 35 U.S.C. § 103(a) as being unpatentable over Suzuki et al. (Japanese Patent App. Pub. No. 08-048595) ("Suzuki") in view of Timans et al. (U.S. Patent App. Pub. No. 2004/0149715 A1) ("Timans"). The rejection again incorporated Sheets (U.S. Patent No. 4,698,486) ("Sheets"). Applicants traverse the rejection for the following reasons.¹

Improper Final Rejection:

The finality of the Office Action is improper. Applicants request withdrawal of its finality, since the Examiner did not rebut or answer all of Applicants' previous arguments.

As stated in M.P.E.P. § 706.07, "where a single previous Office action contains a complete statement of a ground of rejection, the final rejection may refer to such a statement and also *should include a rebuttal of any arguments raised in the applicant's reply*" (emphasis added). Additionally, M.P.E.P. § 707.07(f) states: "[w]here the applicant traverses any

¹ The Office Action may contain statements characterizing the related art, case law, and claims. Regardless of whether any such statements are specifically identified herein, Applicants decline to automatically subscribe to any statements in the Office Action.

rejection, *the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it*" (emphasis added).

In the present case, the Examiner did not respond to any of Applicants' previous arguments, other than to say the "amendment necessitated the new ground(s) of rejection presented in this Office action" (Final Office Action, p. 13). Therefore, at minimum, the Examiner should address all of Applicants' arguments in the next Office Action if any of the claims still stand rejected.

Regarding Amendments to the Claims:

Independent claims 1, 6, 14, and 22 have been amended to include elements of claim 5 and now-cancelled claims 8, 18, and 32, respectively. Support for the amendments may be found in original claims 5, 8, 18, and 32, as well as in the specification at, for example, page 10, lines 14-22, page 29, lines 2-19, and page 31, line 10 to page 32, line 8.

Applicants respectfully request that this Amendment after Final under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 1-7, 9-12, 14-17, 19-23, 26-31, 33, and 34 in condition for allowance. The proposed claim amendments are fully supported by the disclosure as-filed, and contain amendments to present elements of now-cancelled dependent claims into independent claims. Therefore, the proposed amendments do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner. Thus, there is no barrier preventing the Examiner from entering this Amendment after Final, and it should allow for immediate and favorable action.

Rejection of Claims 1-34 under 35 U.S.C. § 103(a):

Applicants traverse the rejection of claims 1-34 under 35 U.S.C. § 103(a) because a *prima facie* case of obviousness has not been established based on Suzuki, Timans, and Sheets.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). M.P.E.P. § 2142, 8th Ed., Rev. 3 (August 2005), p. 2100-1 34.

A *prima facie* case of obviousness has not been established because, among other things, Suzuki, Timans, and Sheets, taken alone or in combination, do not teach or suggests each and every feature of Applicants' claims.

Independent claim 1:

Regarding the rejection of independent claim 1, the Examiner alleged "Suzuki teaches an annealing furnace, comprising: [...] a susceptor 7 located in the processing chamber so as to load the substrate and having an auxiliary heater for heating the substrate at 650 °C or less [0017] ..." (Final Office Action, p. 2). The Examiner's allegation is incorrect. While Suzuki does show upper support plate (quartz susceptor) 7 in Fig. 1, the susceptor does not include at least Applicants' claimed "a susceptor located in the processing chamber so as to load the substrate *and having an auxiliary heater* for heating the substrate at 650 °C or less, the susceptor having a surface made of quartz" (claim 1, emphasis added). The Examiner points to the machine-generated English language translation, par. [0017], in support of his allegation that Suzuki teaches an auxiliary heater in susceptor 7. Suzuki's par. [0017], however, mentions two or more heat lamps 13, which are shown above the wafer substrate in Fig. 1. The heat lamps are clearly not an *auxiliary heater* in the susceptor 7.

Moreover, on page 3 of the Final Office Action, the Examiner alleged that Suzuki teaches “a transparent window located on an upper part of the processing chamber facing the susceptor; and a main heater 13 configured to irradiate a pulsed light...” (emphasis added). If the Examiner applies Suzuki’s heat lamps 13 against Applicants’ claimed “main heater configured to irradiate a pulsed light on the surface of the substrate to heat the substrate from the transparent window...” (claim 1), then heat lamps 13 cannot also be Applicants’ claimed “auxiliary heater for heating the substrate at 650 °C or less” (claim 1).

In addition, the Examiner admitted that Suzuki “fails to teach the pulsed light having a pulse duration of approximately 0.1 ms to 200 ms” (Final Office Action, p. 3), and applied Timans to teach pulsed light of this duration. Id. Even if Timans teaches Applicants’ claimed “pulsed light having a pulse duration of approximately 0.1 ms to 200 ms and having a plurality of emission wavelengths” (claim 1), Timans still does not cure Suzuki’s deficiencies in that neither reference teaches nor suggests at least Applicants’ claimed “susceptor located in the processing chamber so as to load the substrate and having an auxiliary heater for heating the substrate at 650 °C or less” (claim 1).

Independent claim 6:

The Examiner’s rejection of independent claim 6 is not properly presented, at least because it provides no citations whatsoever to specific disclosure in either Suzuki or Timans. Furthermore, the rejection includes Sheets, which is incorporated by reference in Timans. Sheets is not properly listed in the heading of the rejection as an applied prior art reference, although the Examiner did list Sheets on the PTO-892 accompanying the Final Office Action (in response to Applicants’ previous request in the Amendment filed on June 2, 2005).

Applicants respectfully remind the Examiner that

In rejecting claims for want of novelty or for obviousness, the examiner must cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, *the particular part relied on must be designated as nearly as practicable. The pertinence of each reference, if not apparent, must be clearly explained* and each rejected claim specified. 37 C.F.R. §1.1.04(c)(2), M.P.E.P. § 707, emphasis added.

The Examiner appears to rely on Sheets's Fig. 12, reproduced on page 6 of the Final Office Action, despite the rejection header referring only to Suzuki and Timans. Even so, the apparatus that Sheets depicts in Fig. 12, when combined with Timans and/or the susceptor in Suzuki, still fails to teach or suggest at least Applicants' claimed

...first susceptor located in the first processing chamber so as to load the substrate transferred by the transfer robot, a first introduction conduit supplying a first gas in parallel to a surface of the substrate, a first exhaust conduit facing the introduction conduit so as to exhaust the first gas from the processing chamber, a protective member made of quartz configured to prevent oxidation or corrosion on side and bottom inner walls in the first processing chamber ... (claim 6, emphasis added).

Independent claim 14:

The Examiner's rejection of independent claim 14 is also not properly presented, at least because it provides no citations whatsoever to specific disclosure in either Suzuki or Timans. Nevertheless, Suzuki and Timans, taken alone or in combination, fail to teach or suggest at least Applicants' claimed "introducing at least one of an oxidation gas and a nitridation gas in parallel to a surface of a substrate loaded on a susceptor in a processing chamber from an introduction conduit to an exhaust conduit, *the introduction conduit and the exhaust conduit each connected to a top portion of sidewalls in the processing chamber and facing each other*" (claim 14, emphasis added).

Suzuki's gas inlet/exhaust tubing 12, while located parallel to the surface of the wafer on susceptor 7, is not located at a top portion of the sidewalls in the processing chamber. In this

respect, Suzuki's deficiency is clearly highlighted by comparison to Applicants' Fig. 1, which illustrates introduction/exhaust conduits 17, 18, each connected to a top portion of sidewalls in the processing chamber and facing each other, as recited in claim 14. Furthermore, Timans does not even teach or suggest an introduction conduit and exhaust conduit.

Independent claim 22:

The Examiner's rejection of independent claim 22 is also not properly presented, at least because it provides no citations whatsoever to specific disclosure in either Suzuki or Timans. For the reasons presented in the previous section regarding independent claim 14, Suzuki and Timans, taken alone or in combination, fail to teach or suggest at least Applicants' claimed *"introducing a first gas in parallel to a surface of the substrate loaded on the first susceptor from an introduction conduit to an exhaust conduit, the introduction conduit and the exhaust conduit each connected to a top portion of sidewalls in the processing chamber and facing each other"* (claim 22, emphasis added).

Finally, the Examiner alleged "RCA cleaning is well known in the art and cleaning a semiconductor substrate prior to a fabrication step is well known" (Final Office Action, p. 10). Applicants submit that the Examiner's presumed taking of Official Notice is improperly presented. A general allegation that something may be "well known" is not sufficient to support taking of Official Notice. Applicants respectfully remind the Examiner that

the basis for [the Examiner's] reasoning must be set forth explicitly. The examiner must provide specific factual findings predicated on sound technical and scientific reasoning to support his or her conclusion of common knowledge. See *[In re Soli]*, 317 F.2d 941, 137 U.S.P.Q. 797 (CCPA 1963)], 317 F.2d at 946, 37 USPQ at 801; *[In re Chevenard]*, 139 F.2d 711, 60 U.S.P.Q. 239 (CCPA 1943)], 139 F.2d at 713, 60 USPQ at 241. The applicant should be presented with the explicit basis on which the examiner regards the matter as subject to official notice and be allowed to challenge the assertion in the next reply after the Office

action in which the common knowledge statement was made. M.P.E.P.
§ 2144.03(B).

Overall deficiencies of the cited references:

In Suzuki, there is no teaching or suggestion of the claimed “gas sources including one of a reduction gas and a gas containing halogen for removing a native oxide film formed on the substrate” (claim 1), “first gas including one of a reduction gas and a gas including halogen for removing a native oxide film formed on the substrate” (claim 6), “pretreatment of removing a native oxide film on the surface of the substrate by supplying one of a reduction gas and a gas including halogen” (claim 14), or “first processing removing a native oxide film on the substrate by use of one of a reduction gas and a gas containing halogen as the first gas” (claim 22).

For example, Suzuki's Fig. 1 teaches a vapor deposition apparatus including a reaction chamber 5 (paragraph [0014]), a susceptor 7 made of quartz located in the reaction chamber 5 so as to load a wafer W (paragraph [0015]), a gas introducing conduit 11 introducing a reactive gas G in the reaction chamber 5 (paragraph [0017]), a gas exhaust conduit 12 exhausting the gas (paragraph [0017]), quartz windows 3 and 4 on top and bottom faces of the reaction chamber 5 (paragraph [0014]), and a plurality of heating lamps 13 made of infrared lamp irradiating an infrared light inside the reaction chamber 5 through the quartz windows 3, 4 to heat the wafer W in the reaction chamber 5.

Moreover, Suzuki fails to teach or suggest the claimed “susceptor ... having an auxiliary heater” (claim 1), claimed “protective member made of quartz configured to prevent oxidation or corrosion on side and bottom inner walls” (claims 1 and 6), claimed “main heater configured to irradiate a pulsed light ... having a pulse duration of approximately 0.1 ms to 200 ms” (claim 1, similar recitation in claims 6 and 22), claimed “removing a native oxide film on the substrate”

(claims 1, 6, 14, and 22), and claimed “one of a reduction gas and a gas containing halogen” (claims 1, 6, 14, and 22).

In addition, Timans fails to teach or suggest at least the claimed “gas sources including one of a reduction gas and a gas containing halogen for removing a native oxide film formed on the substrate” (claim 1), “first gas including one of a reduction gas and a gas including halogen for removing a native oxide film formed on the substrate” (claim 6), “pretreatment of removing a native oxide film on the surface of the substrate by supplying one of a reduction gas and a gas including halogen” (claim 14), or “first processing removing a native oxide film on the substrate by use of one of a reduction gas and a gas containing halogen as the first gas” (claim 22).

For example, Timans teaches surface preparation for preparing surfaces by short pulses of energy, prior to the formation of thin dielectric coatings. The surface preparation includes cleaning silicon surfaces by flash heating them to >1200 °C, and removal of organic materials from the wafer surface or removal of metallic impurities with oxygen or ozone, or with halogen-bearing compounds, using the full spectrum of light from the pulsed lamp, including a substantial amount of UV radiation.

However, in Timans, there is no teaching or suggestion of the above-quoted elements of claims 1, 6, 14, or 22.

* * *

Since the cited references do not combine to teach or suggest all the features of the independent claims, as discussed above, Applicants note that

[t]he initial burden is on the examiner *to provide some suggestion of the desirability of doing what the inventor has done*. "To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention *or the examiner must present a convincing line of reasoning as to why the artisan would have found the*

claimed invention to have been obvious in light of the teachings of the references." Ex parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). M.P.E.P. § 706.02(j), italics added.

The Examiner fails to provide any reasoning, let alone a convincing line of reasoning, as to why one would have found the claimed invention to have been obvious in light of the teachings of Suzuki, Timans, and/or Sheets, other than general allegations such as, for example, "it would have been obvious ... because heat is applied in a controllable way" (Final Office Action, p. 3). The Examiner merely provides conclusory statements about the cited references, none of which are sufficient to constitute establishment of a *prima facie* case of obviousness.

Therefore, the Examiner's reliance on Suzuki, Timans, and/or Sheets fails to establish *prima facie* obviousness of independent claims 1, 6, 14, and 22. Claims 2-5, 7, 9-12, 15-17, 19-21, 23, 26-31, 33, and 34 are allowable at least by virtue of their respective dependence from allowable base claim 1, 6, 14, or 22. Therefore, the improper 35 U.S.C. § 103(a) rejection of claims 1-34 should be withdrawn.

Conclusion:

In view of the foregoing, Applicants request reconsideration of the application. Pending claims 1-7, 9-12, 14-17, 19-23, 26-31, 33, and 34 are in condition for allowance, and Applicants request a favorable action.

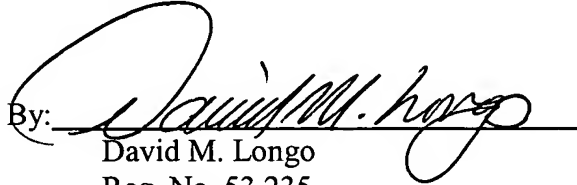
If there are any remaining issues or misunderstandings, Applicants request the Examiner telephone the undersigned representative to discuss them.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: November 8, 2005

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